

Zero Retries issue 0013 2021-10-08

Advanced Amateur Radio - Data Communications; Space; Microwave... the fun stuff! Nothing great has ever been accomplished without irrational exuberance. [Tom Eyslin](#). *Irrational exuberance is pretty much the business model of Zero Retries.* Steve Stroh N8GNJ *The Universal Purpose of Ham Radio is to have fun messing around with radios.* Bob Witte K0NR

Steve Stroh N8GNJ, Editor

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Request To Send

This issue of Zero Retries isn't up to my (self-imposed) standards for quality, completeness, and punctuality. This is the first issue that hasn't gone out at 15:30 on Friday afternoon since I began publishing - drat!

It's been a busy couple of weeks in my life without much time for heads-down thoughtful writing, including Zero Retries. I'm involved in the [Bellingham Makerspace](#) assisting my wife Tina KD7WSF in her role as Bellingham Makerspace's Interim Executive Director. There's been a lot of (mostly metaphorical, but some actual) heavy lifting to do at the Bellingham Makerspace. The most recent such activity is that tomorrow (Saturday October 9, 2021) the Bellingham Makerspace will be hosting the first [Bellingham Maker Faire](#), which is the first Maker Faire (that I'm aware of) in several years in the Pacific Northwest, after the Seattle Mini Maker Faire was discontinued.

As part of the Bellingham Maker Faire (which was conceived and executed on a tight timeline of only a few months), a couple of weeks ago I was offered space in the Makerspace, and the Maker Faire, to "show off Ham Radio". That offer was a great opportunity, and I've been scrambling ever since to put present Amateur Radio to the Maker Faire audience that will be touring the Bellingham Makerspace from 10:00 to 17:00. I'm bringing a comfortable stool, and will have plenty of hydration available.

Thus, here's some "behind the scenes" of the Amateur Radio area of the Bellingham Makerspace, and the preparations for promoting Amateur Radio at the Bellingham Maker Faire to be held next door to the Bellingham Makerspace.

Post-publication update: As of 2021-12-15, my wife Tina KD7WSF and I are no longer associated with the Bellingham Makerspace and the Bellingham Makerspace Amateur Radio Group. Thus ends my experiment to try to create a different kind of Amateur Radio organization at a Makerspace. It might be possible to pivot my ideas for a "new paradigm Amateur Radio Group" to a different community in the Bellingham area - to be determined.

Amateur Radio at the Bellingham Makerspace

A few months ago, I *very casually* floated the idea of "doing something with Amateur Radio" within the Bellingham Makerspace community. As I continued to talk up the idea, a consensus emerged between members of the Makerspace that are also Amateur Radio Operators that there should be a "formal" Amateur Radio group within Bellingham Makerspace. To my surprise, the idea has taken root within the Bellingham Makerspace community. One of the reasons to create such a group is that the Bellingham Makerspace is located in a store space at the [Bellis Fair Mall](#) in Bellingham, Washington and as such it's a public venue. The Bellingham Makerspace membership is growing, in part, to the simple expedient of people encountering such an unexpected "store" in the mall, they take a quick tour, and more than a few now have apparently decided that "Wow, this looks like fun", and sign up to become Makerspace members. On weekends, the Makerspace benefits from a lot of energy from bright young folks looking for their next challenge(s), and I hope to show off Amateur Radio to them in a way that actually interests them - think radios based on Raspberry Pi radios rather than Morse Code keys. Or maybe we'll just get Raspberry Pi Zeros to deal with the Morse Code.

To display Amateur Radio, I was given a prominent spot at the front of the Makerspace, and over the coming months we will flesh it out to display various interesting aspects of Amateur Radio, including loans of some of my personally owned units and systems. One challenge is that we quickly learned that the mall's management is... *unreceptive*... to the idea of *any* antennas, even satellite or microwave, antennas on the roof or even attached to the building. Apparently the large retail tenants with legal requirements for satellite terminals on the roof can navigate that issue, but Bellingham Makerspace is a small non-for-profit with no legal budget :- (As an example, for the upcoming Maker Faire, I floated the idea of an antenna and pole magnetically clamped to the large dumpster just outside the back door of the Makerspace, and the mall management quickly demanded "detailed engineering drawings" and "required approvals" for this idea. Thus there are now no plans for *any* external antennas.

While Bellingham Makerspace Amateur Radio Group (BMARG) might not have external antennas, we do have Internet Access. At the moment the Makerspace's Internet access is the usual basic, crappy DSL from Centurylink, it's possible that we might be able to get Gigabit Fiber from Centurylink - to be determined. We also might have the option of Comcast Business Service (with the benefit of some static TCP/IP addresses). Thus our planning has begun to shift to remotely operated radios, especially those that have remoteable front panels. My thinking is that young folks eyes glaze over when shown yet another computer display... but they might get interested when they see something they've never seen before, like [FlexRadio's Maestro Control](#)

[Console:](#)



FlexRadio Maestro Control Console Photo courtesy of FlexRadio Systems

The companion “back end” to this unit will be one of the FlexRadio radio systems, probably the FLEX-6400 located somewhere in rural Whatcom County with low RF noise and reasonable Internet Access.



FLEX-6400 Photo courtesy of FlexRadio Systems

Because this “radio” (the Maestro Control Console) will be in an open area accessible to the Makerspace members and the public, I hope that there can be a modification (new feature?) of the FlexRadio SmartSDR software that would “lock out” transmit capability except when there is a licensed operator present.

One nice win already for Amateur Radio at the Bellingham Makerspace is that the Mount Baker Amateur Radio Club recently held an ARRL Volunteer Examiner session for three prospective Amateur Radio Operators, and two of the three passed and are awaiting their new callsigns.

Future plans for BMARG include:

- Another display for remote receivers such as a [WebSDR](#) (with audio)
- Testing to see how well VHF and UHF are able to penetrate the challenging RF environment of the mall with low power and indoor antennas.
- AREDN nodes via tunnel to the Whatcom County AREDN mesh network.
- Representative radios (probably on loan from my extensive stock).
- Familiarization classes for Amateur Radio to explain the “big picture” of Amateur Radio rather than traditional multi-week classes. In my opinion, there are ample self-study options to study for a Technician license, and what’s needed is an overview of what Amateur Radio actually is, and what you can do with it, in 2021.
- Familiarization classes for Amateur Radio projects that can be built around Raspberry Pi computers.
- It would be ideal to promote some Maker activities that combine radio with “Making”. One idea that comes to mind is to build [some SatNOGS stations](#) including 3D printing some components, building antennas, assembling rotor controllers, software defined receivers, and best of all, Raspberry Pi computers.
- A small library of relevant materials such as a current ARRL Handbook and notebooks of interesting Amateur Radio projects built around Raspberry Pi computers.
- I’ve ordered several other Raspberry Pi 400s and will eventually install a Windows system for some software that will only run on Windows. I hope the Raspberry Pi 400s, or an 8 GB Raspberry Pi 4 with large heatsink, will be adequate to run a software defined receiver demonstration.
- I happen to know of an excellent source for grants for funding “Interesting projects for Amateur Radio”, so there may be other interesting projects in the future.

You’ll note an emphasis on Raspberry Pi computers with BMARG’s activities. That’s because it’s a goal of the Bellingham Makerspace to leverage the

very extensive educational materials available from the [Raspberry Pi Foundation](#) to support classes and other activities computer familiarization, programming, and electronics / computer hardware. I hope / plan to be involved in those activities as they develop.

Amateur Radio at the Bellingham Maker Faire

Because it was left to me to present Amateur Radio at the Bellingham Maker Faire... and my call for help to the local Amateur Radio groups to help represent Amateur Radio at the Maker Faire resulted only in one other volunteer (**Thank You Gayland Gump KG7GCF!**), I'll be presenting a "Zero Retries" perspective of Amateur Radio during the Maker Faire.



Bellingham Makerspace Amateur Radio Area - photo by Steve Stroh N8GNJ

The nice sign with the graphic is courtesy of Jason Davies, *Maker Extraordinaire* (the guy's a wizard at so many things) and cofounder of the Bellingham Makerspace. There are similar signs in the Makerspace to delineate various areas of interest.

This display doesn't look like a typical Amateur Radio display - partly by design, and partly for lack of time. By design, I didn't want this display to play into the tired old trope of "Morse Code keys, huge antennas, etc." If there was to be media attending the Maker Faire, I especially didn't want the photo accompanying the story to be yet another person hunched over a radio talking into a microphone.

Instead I wanted to engage interested people into asking about Amateur Radio, hearing about *their* potential interest, and providing some 21st century conversation starters, like a map of active APRS devices in Whatcom County, and WSPR, and microwave networking.

What you see in the photo is about a week's work including cleaning up the previous mess in that area of non-functional electronic artifacts because no one quite knew what to do with that area.

The three signs on the top shelf are:

- **Bellingham Makerspace**

- Amateur Radio Group**

- A group of Amateur Radio Operators who are members of the Bellingham Makerspace are forming an Amateur Radio Group within the Bellingham Makerspace.

- The Amateur Radio Group will focus on digital / data facets of Amateur Radio rather than "traditional" Amateur Radio (shortwave, contesting, Morse Code, etc.)

- We're just getting started in October, 2021 so there isn't much Amateur Radio equipment set up yet.

- We hope to conduct Amateur Radio classes, meetings, and general education meetings about radio and wireless technology in general.

- **Why aren't there any radios or antennas?**

- No antennas:**

- Bellis Fair Mall does not permit Bellingham Makerspace to install outside antennas that would allow radios to perform well.

- No radios:**

- We're just getting started :-)

- We hope for the Bellingham Makerspace Amateur Radio Group to be able to add some radios (with antennas) that will work from within the Makerspace. In addition, we plan to add radios that will allow us to operate "hybrid" with the front panel of a radio at the Makerspace...

- (image of the FlexRadio Maestro Control Panel - see above)

- and the "radio" to be remotely operated in a good radio location, and linked via Internet...

- (image of the FlexRadio FLEX-6400 - see above)

- **Amateur Radio In 2021 Isn't Like Great Grandpa Used To Do It**

- Amateur Radio in this era is more about:**

- Learning about radio technology as part of a technology career; Amateur Radio is literally a license to experiment with radio technology
 - Using Software Defined Radios, including creating new modes of radio communication entirely with software
 - Our radios usually have computers connected to them instead of microphones
We use the many Amateur Radio satellites (including an Amateur Radio Station on the International Space Station)
 - We do fun social activities like "Parks on the Air" where we go to parks and operate portable stations
 - Using (and building) microwave networks
 - Yes, we still use "shortwave" (we call it "High Frequency" or HF)... and sometimes we even talk to each other :-)

The dish to the right side of the desk is my eventual HamWAN connection (5.9 GHz), on a speaker stand for configuration and testing. (Rest assured, it's not active indoors, at eye level, and high gain.) My friend Randy Robinson N7EBB and I spent an afternoon trying to configure this system for HamWAN, and the equipment remained inscrutable to us at the moment - we just could not connect with it. Since it was sitting there in my shop, I thought it just looked cool and it would be a conversation starter. The sign on the dish reads:

Yes, this is an Amateur "Radio"

It is a Broadband Internet Access radio and antenna operating at 5.9 GHz which is an Amateur Radio band. It will connect to a system called HamWAN (<http://hamwan.org>) which operates a high speed microwave network all over Western Washington, with connections to similar systems in British Columbia and Oregon.

Here in Whatcom County, the HamWAN hub is located on Lookout Mountain, south of Bellingham. It has point-to-point connections South to the Snohomish County Department of Emergency Management Headquarters (53 miles) and Triangle Mountain near Victoria BC (56 miles).

While HamWAN does connect with the Internet, HamWAN does not depend on the Internet. If Internet connections are not available, 100% of HamWAN continues to operate. Each hub provides localized services - DNS, DHCP, management, and services such as VOIP, cameras, etc.

Another HamWAN hub is in the planning stages for Mt. Constitution on Orcas Island to provide HamWAN services within the San Juan Islands.

The three video displays are:

- Left - a continuous display of Amateur Radio YouTube videos - they just keep playing one after another.
- Middle - Web browser of [Whatcom County, Washington in aprs.fi](http://whatcomcounty.wa.gov/aprs).
The placard below the display reads:
Automatic Packet Reporting System (APRS)
<https://aprs.fi>
Map is centered on Whatcom County.
Live view - each icon represents a system or vehicle or service.
Most of this information is being transmitted via radio, received, and uploaded to the Internet.
- Right - Web browser of [WSPRNet's map](http://wsprrnet.com).
The placard below the display reads:
Weak Signal Propagation Reporter (WSPR) Network

<https://wsprnet.org>

Live view - each line represents a long distance "contact" that was made from a low-power transmitter to another part of the world. Each transmitter transmits for a few minutes then listens for other WSPR transmissions.

WSPR proves that even very low power radio transmissions can be heard around the world with new technologies such as Digital Signal Processing (DSP), even with a computer as small as a Raspberry Pi.

The two right displays are driven by a [Raspberry Pi 400](#), which are proving to be up to this modest task. The Raspberry Pi has two HDMI outputs. The leftmost display is driven by another Raspberry Pi 400. I like the Raspberry Pi 400 - it's a nice computer for basic tasks like this, and they look cool. I had these units for a couple of months, but had not really used them, and I had forgotten just how small the keyboard was - it's sized for modest hands, not bear paws like mine that cry out for a full size "classic IBM keyboard layout". The one issue I have with the Raspberry Pi 400s is that unlike the classic Raspberry Pi computers, it does not have an audio output, so the only way to have audio (for example, YouTube videos) is to connect a USB audio interface and a speaker. I ordered a likely looking one from Amazon, but it didn't arrive in time.

My task between pushing Send on this issue of Zero Retries, and tomorrow morning, is to create three handouts for those interested in Amateur Radio:

- Information about Zero Retries
- A one page about Amateur Radio resources, including the two major Amateur Radio organizations here in Whatcom County, Washington
- The Multipurpose Remote Nodes paper for the 2021 ARRL and TAPR Digital Communications Conference, featured in Zero Retries 0010. The MRNs were created and deployed here in Whatcom County, so there's some "hometown pride" to be had.

In next week's issue of Zero Retries, I'll report how the "Amateur Radio Show and Tell" at the Bellingham Maker Faire went, with some photos.

Interesting development from the ARRL...

ARRL Continues Its Efforts to Preserve Amateur Radio Secondary Use of the 3 GHz Band

10/07/2021

ARRL President Rick Roderick, K5UR, in a [written statement](#) on the newly filed H.R.5378 before the U.S. House Commerce Communications and Technology Subcommittee on Wednesday, urged Congress to direct the FCC to preserve Amateur Radio's secondary use of the 3 GHz band.

President Roderick's statement was the result of a quick, well-organized response by ARRL to counter the continuing threat to Amateur Radio's secondary use of the 3 GHz band.

Approximately 10 days ago, ARRL became aware of a provision in the \$3.5 Billion Budget Reconciliation Bill that would have required approximately 200 MHz of the 3.1-3.45 GHz band be reallocated to the use of 5G vendors. Moving swiftly, the ARRL Executive Committee authorized FCC counsel to begin preparations to respond. But, confronted with the probable delay of the Reconciliation Bill and an uncertain future for the 3 GHz provisions, Subcommittee Chairman Michael Doyle (D-PA-18) and Rep. Matsui (D-CA-6) introduced similar reallocation language on September 29, 2021 as H.R.5378 (117th Cong., 1st Sess.) and scheduled hearings on it and related communications bills for Wednesday, October 6, 2021.

[Read the rest of the article.](#) Kudos ARRL!

Inductive Twig Will Cease Operations 2021-12-31

[Sad news from Inductive Twig](#) (formerly Enhanced Radio Devices / HamShield). They're one of my favorite Amateur Radio vendors ever since their groundbreaking HamShield radio. Inductive Twig has some good LoRa products adapted to Amateur Radio with reasonable transmit power. I've got some quick shopping to do!

October 06, 2021

We will say goodbye on Dec 31, 2021

When we started building HamShield ten years ago, we had no idea how far that simple project would take us. What started as a simple project among a few friends became one of the most-funded Arduino shields on kickstarter. We went from there to the Edison Award winning Explorer block, then to LoRa devices and more. We've heard from users of our products doing all sorts of amazing projects, and dreamed up many more projects ourselves. Unfortunately, between the covid situation and changing life circumstances, we can't keep operating Inductive Twig. We'll be closing down at the end of the year.

Covid has been hard for everyone. While we've been able to avoid getting sick, it's thrown a wrench in our lives and our business. This business has always been more a labor of love than a money-making proposition, but the past few years have made it clear that we can't keep things running the way we have been.

It's going to be sad to say goodbye. We have loved contributing to the radio community. All of our designs are open source, and we'll be leaving the hardware and software online after we close. If you can find the parts, you'll still be able to make a HamShield or Explorer device. We just won't be selling them or officially supporting them.

We'll be remaining open through the end of the year to sell our remaining stock. We expect all orders to ship promptly, but we won't be restocking anything that sells out.

Thanks for the wild ride.

73

The Inductive Twig Team

Closing The Channel

As of 2021-09-13, Zero Retries is now on Twitter - [@zeroretires](#). I'm not yet *very* active there, but I'll try to pay attention.

A commenter in Reddit pointed out that I should disclaim that the views I express in about Amateur Radio in Zero Retries are mostly about Amateur Radio in the US. That comment is correct, thus consider it disclaimed that Zero Retries has a US-centric perspective of Amateur Radio. I do my best to think of "rest of world" Amateur Radio in my writing, but I'm not there in other parts of the world, so if I say something blatantly inaccurate, please call me out.

If you're enjoying Zero Retries, please tell your friends and co-conspirators. For the immediate future, Zero Retries will remain an experiment in progress. Feedback is easy if you're reading Zero Retries in email - just hit Reply and I'll get your email. Or you can go to the web version of any Zero Retries issue, scroll to the bottom, and post a comment on the web version of a Zero Retries issue. I'm especially interested in content ideas about things that you'd like to see discussed in Zero Retries. If you know of "Zero Retries Interesting" projects, groups, activities, etc. please let me know. I do reply to every Zero Retries email I receive.

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All previous issues of Zero Retries are available without restriction (no paywalls). For some background on Zero Retries, Issue 0000 was The Introduction Issue.

Thanks for reading!

Steve Stroh N8GNJ

Bellingham, Washington, USA

2021-10-08

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Below is a much more complete "footer" that has evolved over 30+ issues of ZR.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, here are some pointers:

- **Ham Radio for Dummies** by Ward Silver N0AX is a great overview of Amateur Radio. N0AX is a gifted writer and HRFD is now in its [4th edition](#).
- My two favorite **YouTube** channels for a good overview of Amateur Radio are [AmateurLogic.TV](#). and [Ham Nation](#) (part of Ham Radio Crash Course). These folks just seem to have so much fun!
- [Radio Amateur Training Planning and Activities Committee \(RATPAC\)](#) offers weekly presentations on general Amateur Radio topics (Wednesdays) and emergency communications in Amateur Radio (Thursdays).
- Dan Romanchik KB6NU offers a free **No-Nonsense Study Guide** for the [Technician test](#) (PDF).
- [HamExam.org Amateur Radio Practice Exams](#) offers good **Flash Card and Practice Exams**.
- When you're ready to take an **Amateur Radio examination** (Tech, General, or Extra), W1MX - The MIT Amateur Radio Society offers [remote exams](#), free for students and youngsters. *There are apparently [many other remote exam options](#).*

Bonus - with an Amateur Radio license, you'll be [more attractive on dates](#) 😊

Closing the Channel

- In its mission to grow Amateur Radio and make it more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex!
- My ongoing Thanks to Tina Stroh KD7WSF for, well, *everything* and Bill Vodall W7NWP as *Zero Retries Instigator in Chief*.
- My ongoing Thanks to pseudostaffers [Dan Romanchik KB6NU](#) and [Jeff Davis KE9V](#) for continuing to spot, and write about "Zero Retries Interesting" type items, on their respective blogs, from Amateur Radio and beyond, that I don't spot on my own.
- [Southgate Amateur Radio News](#) consistently surfaces "Zero Retries Interesting" stories.
- The [Substack email publishing platform](#) makes Zero Retries possible. I recommend it for publishing newsletters.

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More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ (He / Him)

These bits were handcrafted in beautiful Bellingham, Washington, USA

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